

Appl. No. 10/595,703

Amdt. dated March 11, 2009

Reply to Office action of January 14, 2009

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Currently Amended) A method comprising the steps of:
- 2 (a) simulating on a processor a fabrication of a plurality of layout patterns by a lithographic
- 3 process;
- 4 (b) determining sensitivities of the layout patterns to a plurality of parameters based on the
- 5 ~~simulation~~ simulating;
- 6 (c) using the sensitivities to calculate deviations of the layout patterns across a range of each
- 7 respective one of the parameters; and
- 8 (d) selecting ones of the layout patterns having predetermined deviation characteristics to be
- 9 used as test patterns.

- 1 2. (Original) The method of claim 1, further comprising applying optical proximity
- 2 correction, and repeating steps (a) through (d).

- 1 3. (Currently Amended) The method of claim 1, wherein step (b) includes calculating the
- 2 sensitivity of ~~one of the patterns~~ one pattern of the layout patterns with respect to one of the
- 3 parameters as a partial derivative of ~~the deviation~~ a deviation of the one pattern with respect to
- 4 the ~~one parameter~~ one of the parameters, based on only two values of the ~~one parameter~~ one of
- 5 the parameters and the corresponding two values of the deviation of the one pattern.

- 1 4. (Currently Amended) The method of claim 1, wherein step (c) includes calculating the
- 2 deviations of the layout patterns using a first degree polynomial that is a linear combination
- 3 of deviation portions due to each respective parameter, each respective deviation calculated
- 4 based on the respective sensitivity of ~~the pattern~~ one pattern of the layout patterns to that
- 5 parameter.

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1 5. (Currently Amended) The method of claim 1, further comprising automatically selecting
2 ~~the patterns~~ ones of the layout patterns having maximum or near-maximum deviations to be used
3 as test patterns.

1 6. (Currently Amended) The method of claim 5, further comprising printing ~~the patterns~~ the
2 ones of the layout patterns having maximum or near-maximum deviations on a test chip or test
3 wafer.

1 7. (Currently Amended) The method of claim 1, further comprising selecting a plurality of
2 directions, and selecting the respective layout patterns having the maximum deviation in each
3 respective one of the plurality of directions to be used as test patterns.

1 8. (Currently Amended) The method of claim 1, wherein the predetermined deviation
2 characteristics are selected from ~~the group~~ a group consisting of maximum, near maximum,
3 minimum and near minimum deviations in a multidimensional process parameter space.

1 9. (Original) The method of claim 1, wherein the patterns are selected so as to have
2 extremal sensitivities with respect to deviations in process parameters.

1 10. (Currently Amended) A computer-implemented system comprising:
2 means for simulating on a processor a fabrication of a plurality of layout patterns by a
3 lithographic process;
4 means for determining sensitivities of the layout patterns to a plurality of parameters
5 based on the ~~simulation~~ simulating;
6 means for using the sensitivities to calculate deviations of the layout patterns across a
7 range of each respective one of the parameters; and
8 means for selecting ones of the layout patterns having predetermined deviation
9 characteristics to be used as test patterns.

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1 11. (Currently Amended) A computer-readable medium encoded with computer program
2 code, wherein, when the computer program code is executed by a processor, the processor
3 performs a method comprising the steps of:
4 (a) simulating on a processor a fabrication of a plurality of layout patterns by a lithographic
5 process;
6 (b) determining sensitivities of the layout patterns to a plurality of parameters based on the
7 ~~simulation~~ simulating;
8 (c) using the sensitivities to calculate deviations of the layout patterns across a range of each
9 respective one of the parameters; and
10 (d) selecting ones of the layout patterns having predetermined deviation characteristics to be
11 used as test patterns.

1 12. (Currently Amended) A computer implemented system comprising:
2 means for receiving a set of priorities from a user;
3 means for selecting a subset of features of a mask having the highest error rates, using a
4 plurality of layout data;
5 means for constructing an extrema map consistent with ~~the user input~~; a user input
6 including the set of priorities; and
7 means for identifying one or more changes to the layout data based on the extrema map.

1 13. (Currently Amended) The computer implemented system of claim 12, further comprising
2 means for systematically selecting characterizing structures from a layout that is generated from
3 the layout data, the characterizing structures characterizing ~~the~~ lithography and process
4 performance of the layout.

1 14. (Currently Amended) The computer implemented system of claim 13, wherein the
2 selecting of characterizing structures is based on lithographical properties of the characterizing
3 structures.

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1 15. (Currently Amended) The computer implemented system of claim ~~13~~ 14, wherein the
2 characterizing structures are selected based on the lithographical properties of the characterizing
3 structures under variation of a plurality of process parameters.

1 16. (Currently Amended) The computer implemented system of claim 15, wherein the
2 ~~selection~~ selecting of characterizing structures includes: characterizing each process
3 parameter by a respective sensitivity of ~~the pattern~~ layout pattern to changes of that process
4 parameter; and
5 selecting a hull of a multi-dimensional process space by combining the sensitivities and
6 determining maximum and/or minimum values of the combined sensitivities.

1 17. (Currently Amended) The computer implemented system of claim 16, wherein a function
2 modeling non-monotonic sensitivity to one of the process parameters is defined using sampled
3 extrema points.

1 18. (Currently Amended) The computer implemented system of ~~claim 14~~ claim 15, wherein
2 measurements are used to calibrate the process parameters.

1 19. (Currently Amended) The computer implemented system of claim 18, wherein the
2 measurements are deviations in distance, covered area or critical dimension.

1 20. (Currently Amended) An integrated circuit fabricated by a method comprising:
2 (a) simulating a fabrication of a plurality of layout patterns by a lithographic process;
3 (b) determining sensitivities of the layout patterns to a plurality of parameters based on the
4 ~~simulating~~ simulation;
5 (c) selecting ones of the layout patterns to be used as test patterns based on the sensitivities;
6 (d) fabricating the selected test patterns in an apparatus that performs the lithographic
7 process;
8 (e) performing an inspection ~~of~~ on the fabricated test patterns;

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- 9 (f) adjusting the lithographic process based on the inspection; and
- 10 (g) fabricating an integrated circuit in the apparatus using the adjusted lithographic process.